

Meeting Marc Fellous, Emeritus Professor at Paris Diderot and Medical Doctor

“CRISPR-Cas9, a revolutionary editing gene technique? “

1. Why CRISPR technique is often seen as a revolution?

Many techniques able to modify the genome exist. CRISPR is not a revolution considering this point, but today with this technique we can modify the gene we want. The technique is, thus much more precise and the off target critics are no longer relevant. It is possible now to target a specific gene with an extreme precision and faster than we used to do. We do not need to cause genetic changes and then target the genome.

2. Why CRISPR-Cas9 raises more ethical question than previous discoveries?

This is explained by the ease of use of CRISPR. Rules have to be established.

3. What are the applications of this technique today? What can we expect for the future?

As all mutations, the whole world of living organism is concerned: plants, animals, insects ... etc. For instance, CRISPR allowed to create a resisting cucumber to a particular virus in only 1 month when before this technique we would have need 5 years.

CRISPR is also interesting in the struggle against epidemics, we particularly think about the Zika virus transmitted by the mosquito. Today, some scientific are working on this question, the idea is to modify genetically female mosquitos to make them infertile. As a consequence, all the progeny will disappear.

Concerning, the pork xenotransplants to Human, the presence of endogenous retroviruses in animals, is responsible of illnesses or reject. CRISPR-cas9 has been recently used to mute several genes simultaneously in order to deactivate their functions.

Nonetheless, some constraints exist and CRISPR must still deal with them. We need to know the gene in question before being able to mute its function. It is also necessary to take into account the existence of multi-copy genes.

4. Fears of abuse (Eugenics, OGM) are rising, do you understand them? Do you think that we need to limit the use of CRISPR?

The question then arises; can we apply CRISPR technique to human gene?

On this subject, there is a real consensus among scientific: it is not possible to use such technique to modify the future progeny. Germinal cells are thus excluded. But, the question is still open for the somatic ones. A legal framework is necessary, but, it is necessary to have laws which regulate and not prohibit actions.

In France, researchers are controlled by research laboratories and every research projects must contain an ethical part. Researchers are well supervised and thus, risk of abuses are weak.

5. What do you think about the place given to the research in France?

Research in France, is not a priority, this the reason why most of the researchers do not come back in France after their studies.

A researcher is an artist, he creates. He is criticized for being paid for that. Today, research has concrete applications and politicians realize that the area is dynamic and a source of employments. Consequently, researcher is not only an artist, he produces and discoveries enter into the economy of a country.

Nevertheless, research is still badly funded, there is not enough grants for instance.

6. What do you think about the media coverage of this technique?

When we talk about a scientific subject, it absolutely necessary to talk about the advantages and the disadvantages as well. The problem often comes from the media, they globalized everything while doubt is positive. It necessary to doubt, doubt is the fuel of our knowledge. Society must be enlightened and researcher has also need to listen the society.